

PAN AFRICA CHRISTIAN UNIVERSITY

DIPLOMA OF SCIENCE IN INFORMATION TECHNOLOGY

END OF TERM EXAMINATION

DEPARTMENT: COMPUTING & INFORMATION TECHNOLOGY

COURSE CODE: DICT 0132

CAMPUS: ROYSAMBU

COURSE TITLE: OPERATING SYSTEMS

EXAM DATE: MONDAY,XXXX,AUGUST ,2025

TIME: 2:00PM -5:00PM

INSTRUCTIONS

- This exam script has **TWO (2)** sections.
- Read all questions carefully before attempting.
- Answer All questions in Section **A** and any other THREE questions in Section **B**.
- Write only your **student number** on the answer booklet provided.

SECTION A (Answer ALL questions)

QUESTION 1

A hospital uses a computer system to manage patient data, billing, and reports. Each task runs as a separate process tracked by the OS with Process Control Blocks (PCBs). Urgent tasks use preemptive scheduling; others use non-preemptive scheduling. The system uses logical addresses mapped to physical addresses. Devices like barcode scanners and printers are managed by the OS's I/O subsystem.

- a) Describe Process Control Block (PCB) and explain its role in OS process management. **[2 marks]**
- b) Differentiate between: **4 marks]**
 - i. Logical Address and Physical Address
 - ii. Preemptive Scheduling and Non-Preemptive Scheduling
- c) Explore **TWO** functions of the I/O Subsystem in operating systems. **[2 marks]**
- d) Explain deadlock and suggest **ONE** method the OS can use to prevent it. **[2 marks]**

SECTION B (Answer any THREE (3) questions)

QUESTION 2

- a) Jane is using many programs at once on her laptop, and her computer still works smoothly. Explain **THREE** ways virtual memory helps her operating system handle multiple programs efficiently. **[3 marks]**
- b) While studying operating system, Paul wants to understand the difference between monolithic kernels and microkernels. Explain **TWO** key differences between them in terms of design and how they operate. **[2 marks]**

a) David is building software for a heart monitor machine that must respond immediately. Describe **THREE** important features of real-time operating systems (RTOS) that make them suitable for such tasks, and give examples where RTOS are used **[3 marks]**

b) While using a computer, users often manage their files. Explain **TWO** common actions they perform with files, such as saving or deleting, and how the operating system helps with these tasks. **[2 marks]**

QUESTION 3

a) Lucy notices her computer is running slower, and a technician says the file system is fragmented. Explain **TWO** reasons why file system fragmentation happens **[4 marks]**

b) When a computer saves files to the hard drive, it uses different methods to store them. Describe **THREE** file allocation methods the operating system can use **[6 marks]**

QUESTION 4

a) Explain the operation of the following memory management strategies:

- i. Paging
- ii. Segmentation
- iii. Demand Paging

[6 marks]

During an operating system class, Sarah was asked to explain the different types of operating systems. Describe **FOUR** types of operating systems she might talk about

QUESTION 5

- a) James works in an office where protecting files is very important. Explain **THREE** common backup and recovery techniques he can use in the operating system

[6 marks]

- b) Sometimes, a computer needs to move programs in and out of memory to run smoothly. Describe **TWO** situations where swapping is useful in helping the operating system manage memory better

[4 marks]

QUESTION 6

- a) In a school lab, the following processes arrive for execution at the same time. The CPU scheduling follows the First-Come-First-Serve (FCFS) policy.

Process	Burst Time (ms)
P1	5
P2	3
P3	8
P4	6

- b) i. Draw a Gantt chart showing the order of execution. **[2 Marks]**
ii. Calculate the Waiting Time and Turnaround Time for each process. **[2 Marks]**
iii. Find the Average Waiting Time and Average Turnaround Time. **[2 Marks]**
- c) In a multi-user operating system, each employee on a shared office computer has an individual user account. Explain the role of user account management in this environment and suggest **TWO** best practices to enhance user account security. **[4 marks]**

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